BioFuels for the Future

4th Annual S.C. RCC Workshop

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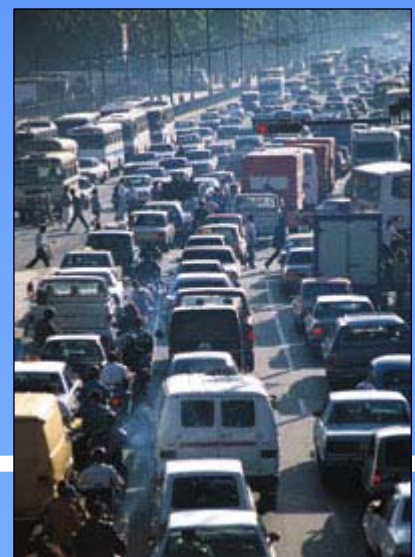
Why Should I Care?

South Carolina Statistics:

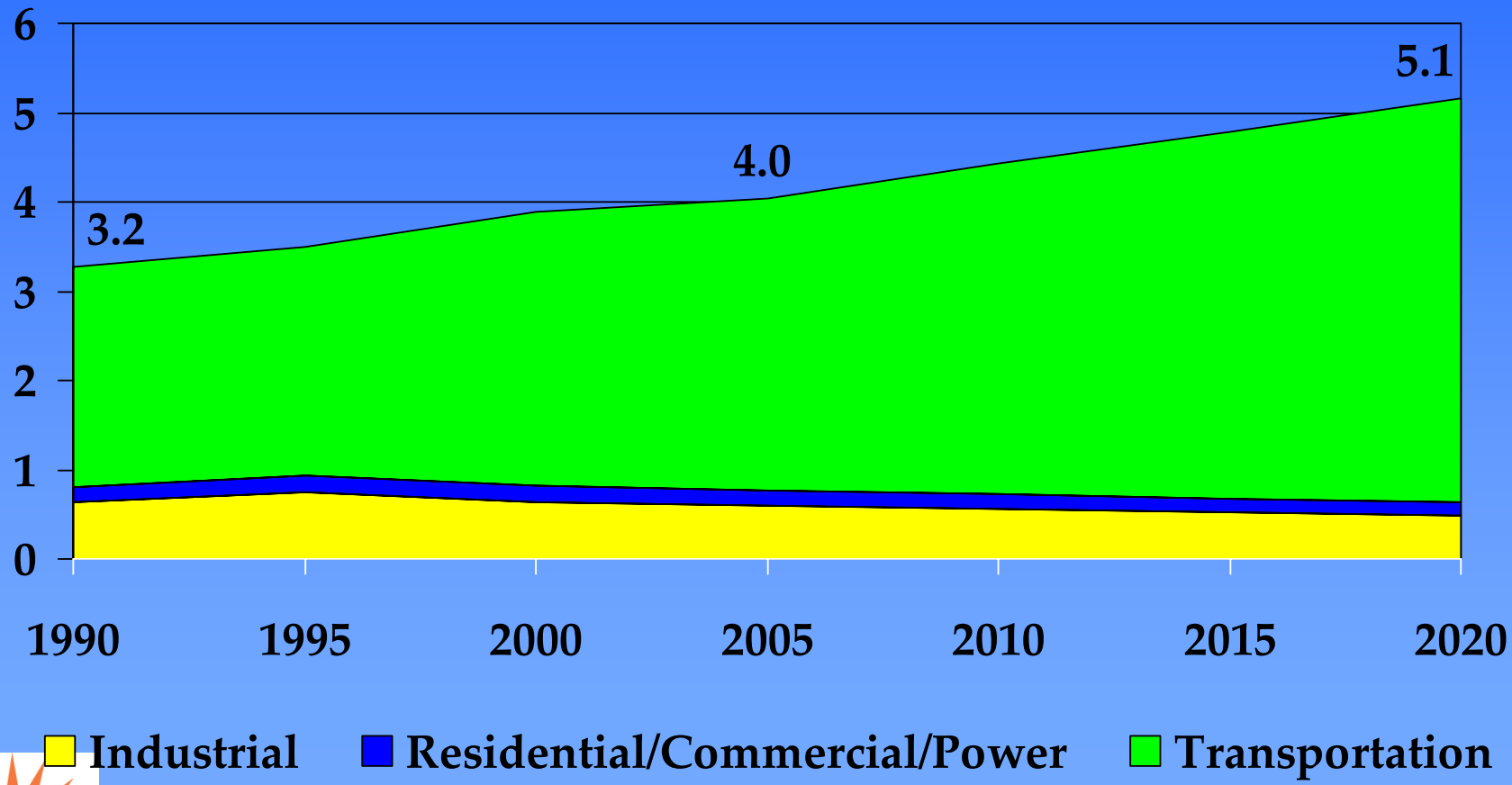
- ✓20th in nation in motor fuel use.
- ✓In 2005 spent $6.4 billion on motor fuel.
- ✓1,020 gallons of motor fuel consumed per registered vehicle in SC, compared to the US average at 753 gallons per registered vehicle.
- ✓790 gallons of motor fuel consumed per capita.

"America is Addicted to Oil"

- U.S. transportation is 97% dependent on petroleum
- Gasoline prices on average are $0.71/gallon higher than 1 year ago—national average retail price of gasoline is $2.87
- Diesel prices on average are $0.60/gallon higher than 1 year ago—national average retail price of diesel is $2.92
- EPA attributes increases in asthma, premature deaths, lost days of work, etc. to air pollution from vehicles.

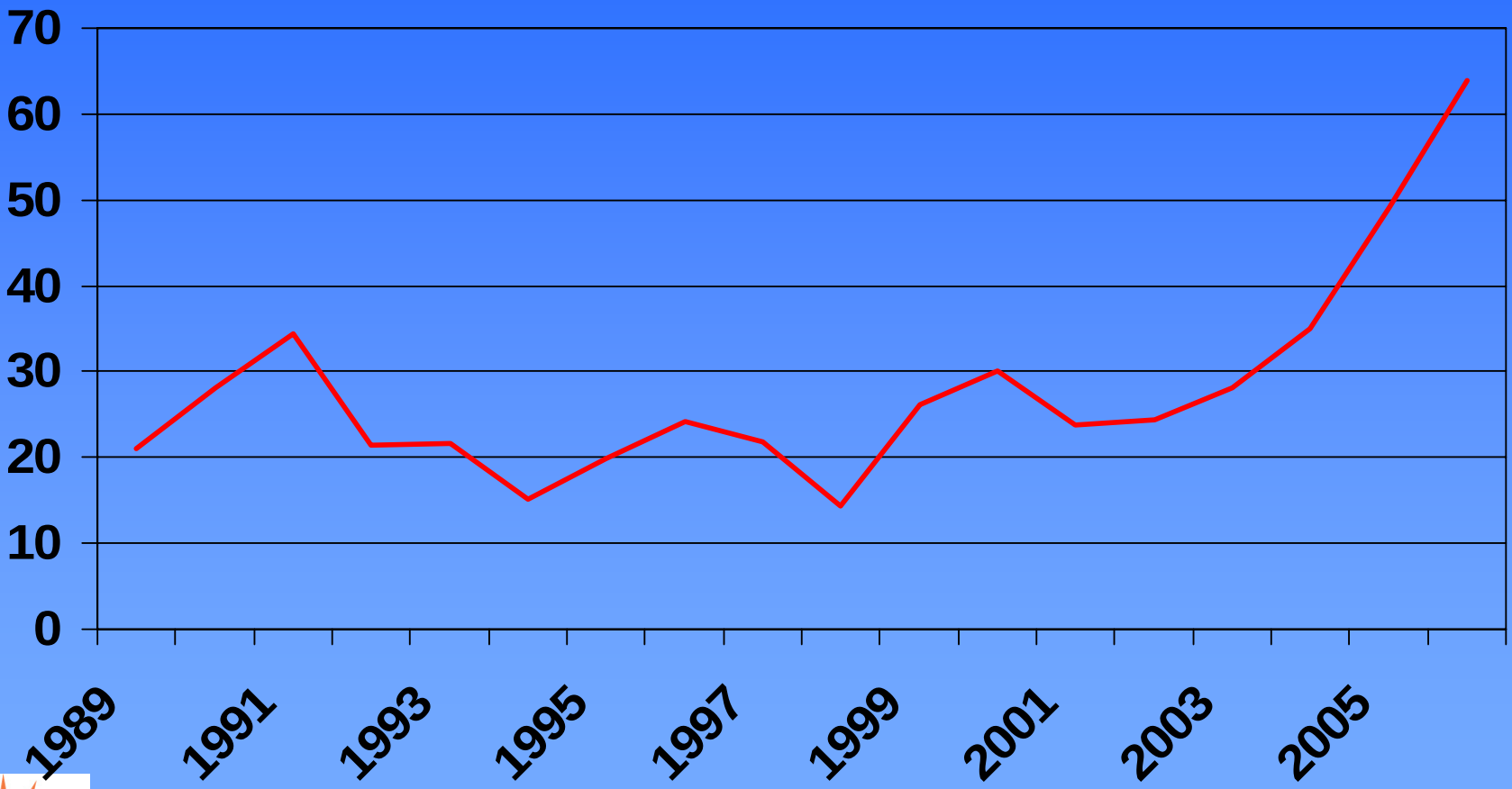


SC Oil Consumption by Sector



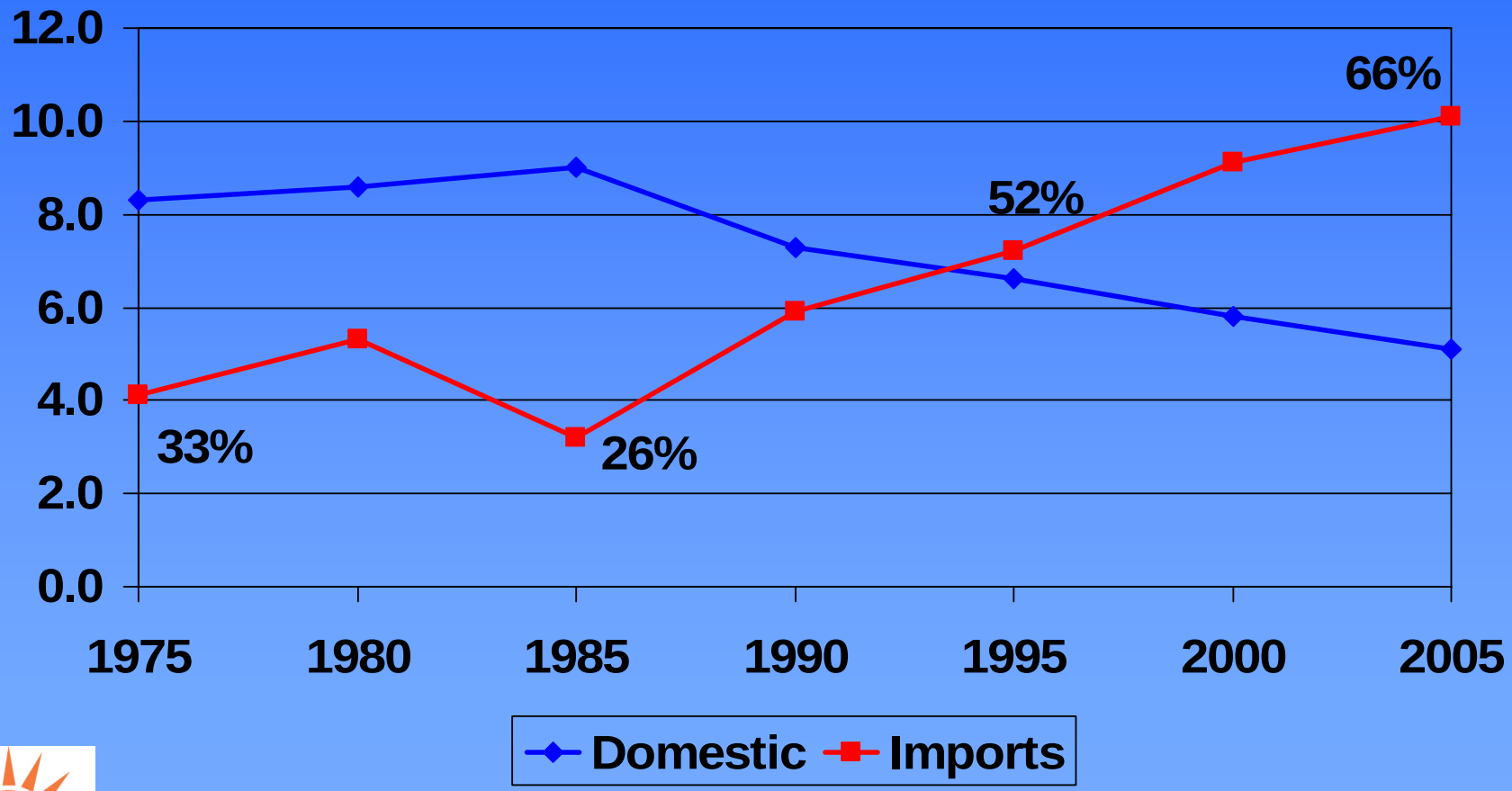
1990-2020 – Trillions of Gallons

U.S. Oil Price Increases



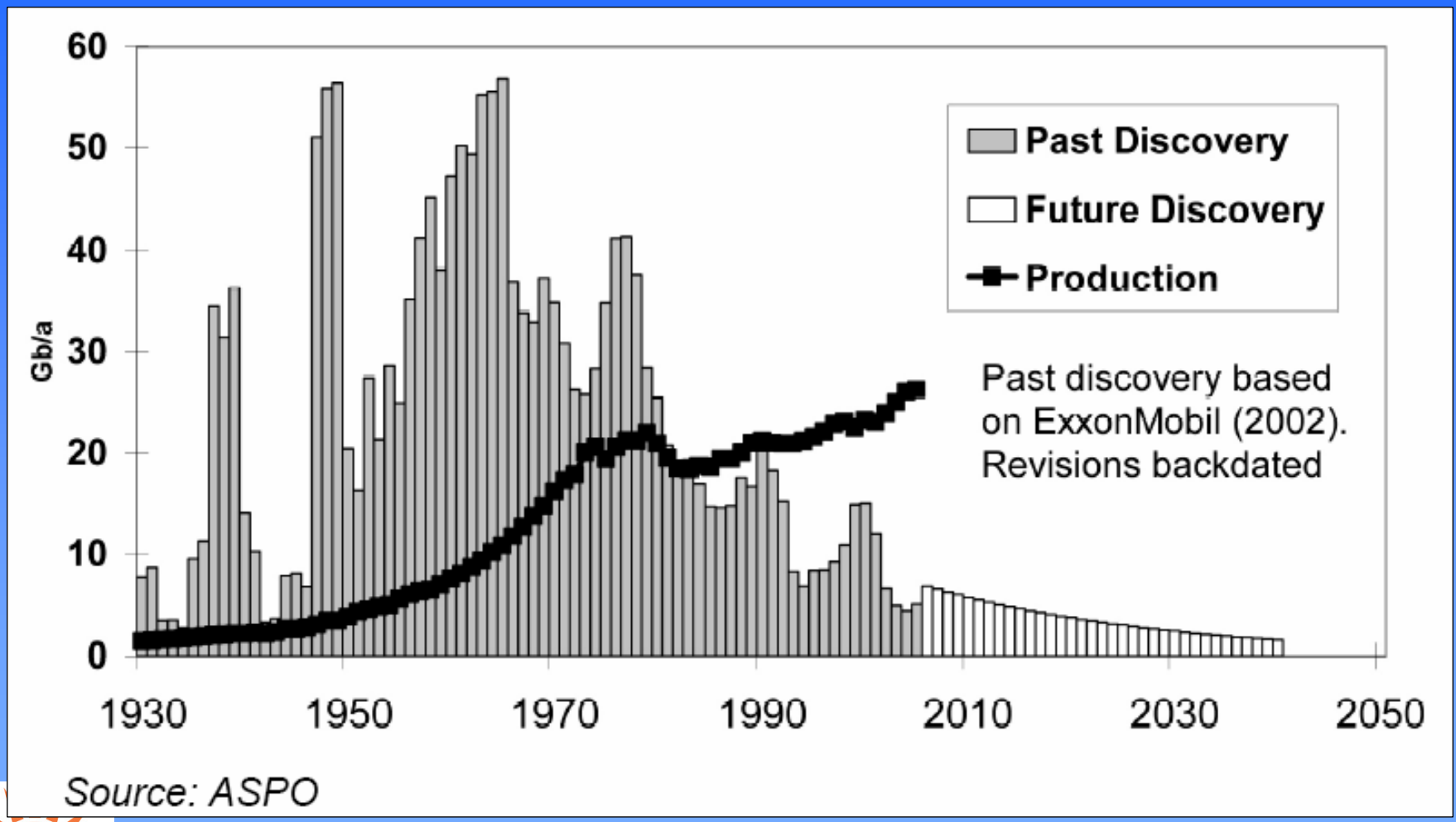
2005 Price – Dollars/Barrel

U.S. Oil Consumption



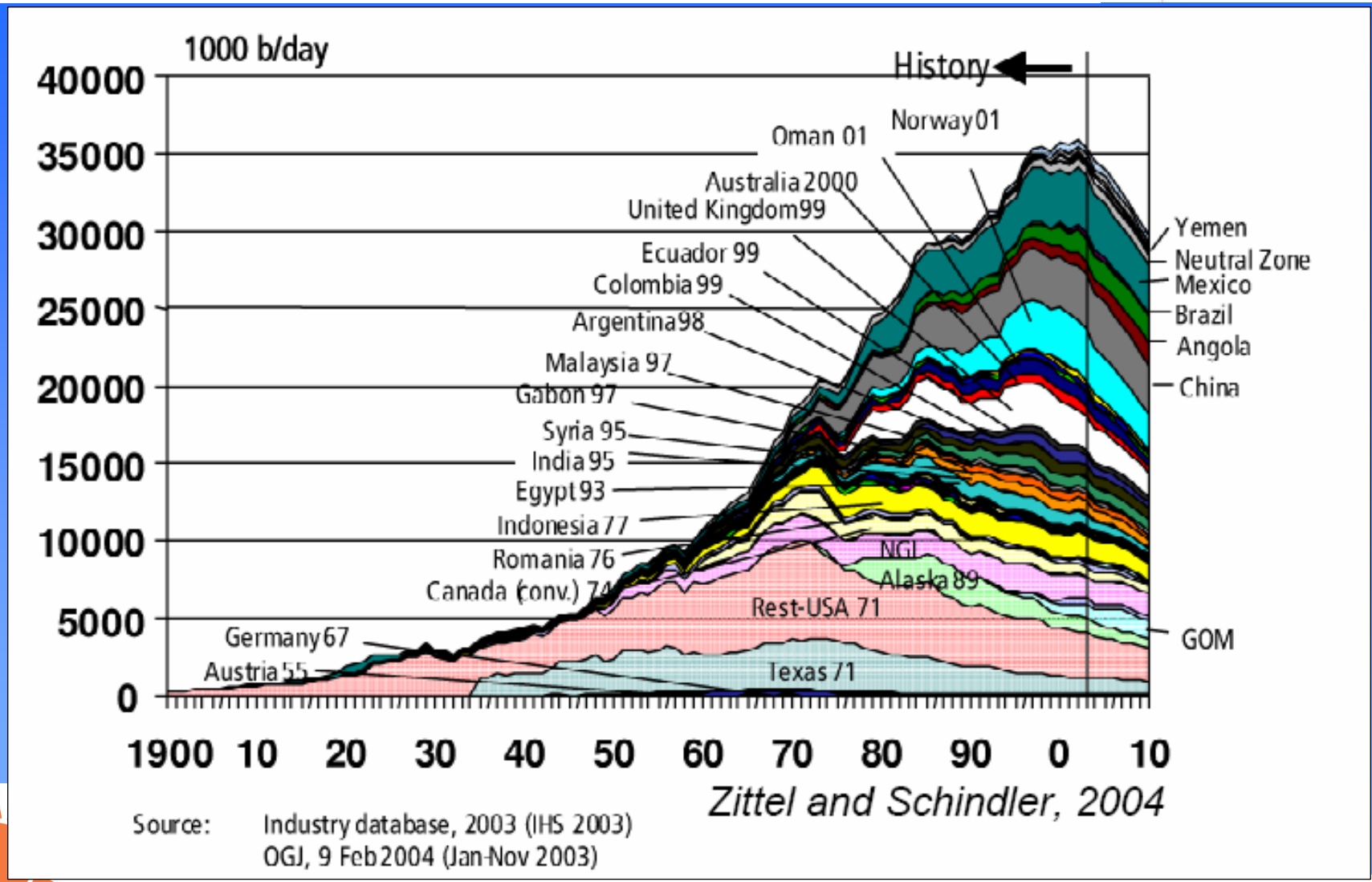
1975-2005 – Million barrels/day

Future Oil Supply Availability



Today we use 5 barrels of oil for every 1 we discover.

Non-OPEC Oil Production



Top Known Oil Reserves

Saudi Arabia – 261.9

Iran – 125.8

Iraq – 115.0

Kuwait – 101.5

United Arab Emirates 97.8

Venezuela – 77.2

Russia 60.0

Libya 39.0

Nigeria 35.3

Billions of Barrels

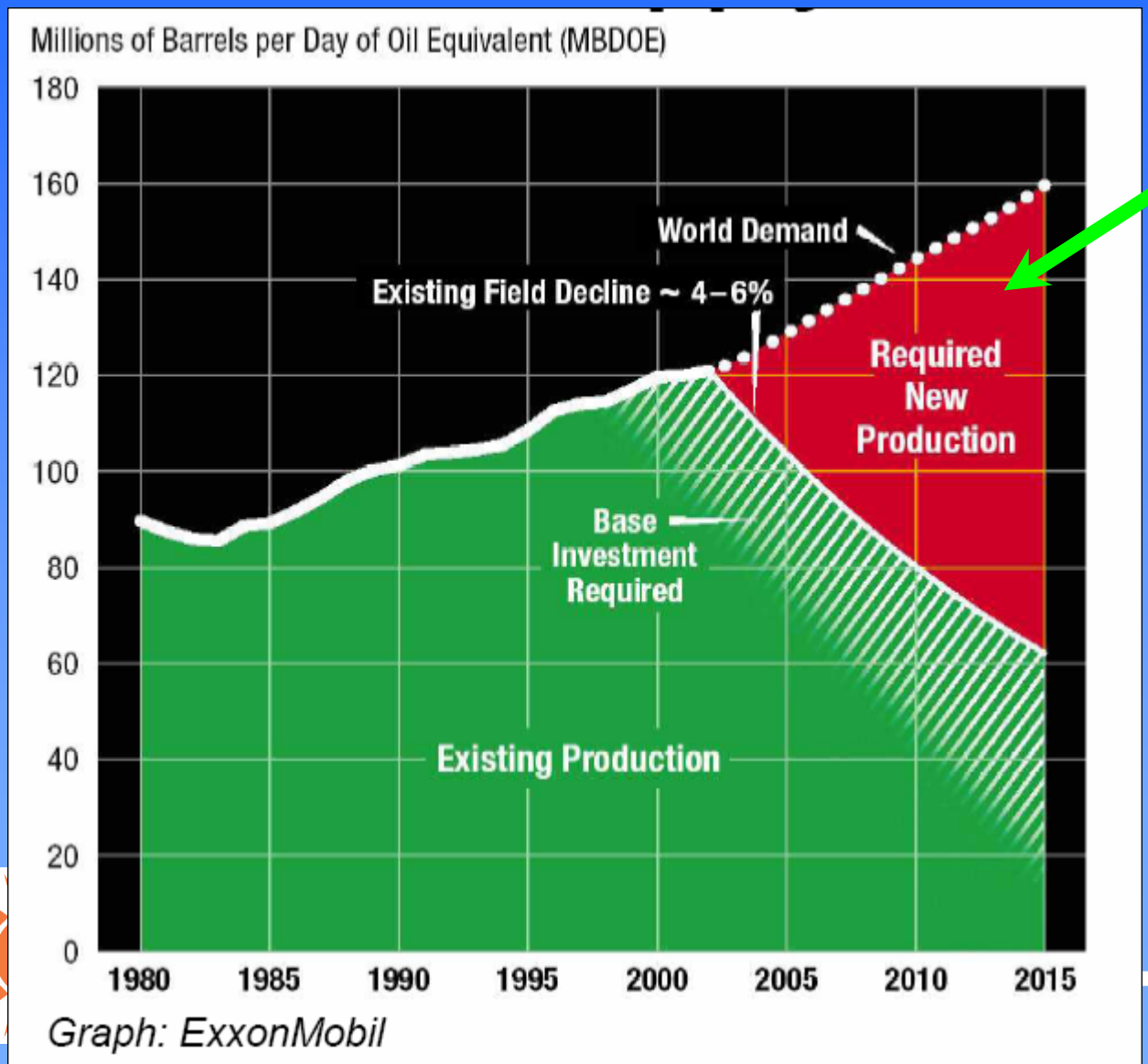
Peak Oil Scenario

- Oil and natural gas will always be available
- But several things will make them much more expensive after the peak of production
  - Gap between supply and demand
  - Increasing cost of extraction
  - Decreasing quality of product (requires more processing with decreased net yield)
- Rising costs of oil and natural gas will increase the price of practically everything

Peak Oil Scenario

- As production slows down, oil and natural gas will become increasingly more expensive
- Fuel and electricity prices will rise
- The cost of transportation will rise
- The price of everything made out of oil and natural gas will rise
  - Plastics
  - Chemicals
  - Agro-chemicals (fertilizer, herbicides, insecticides)
  - Food
  - Anything that takes fossil fuel energy to manufacture

Role of BioFuels



Graph: ExxonMobil

Ethanol & Biodiesel could play a significant role in 'New Production'

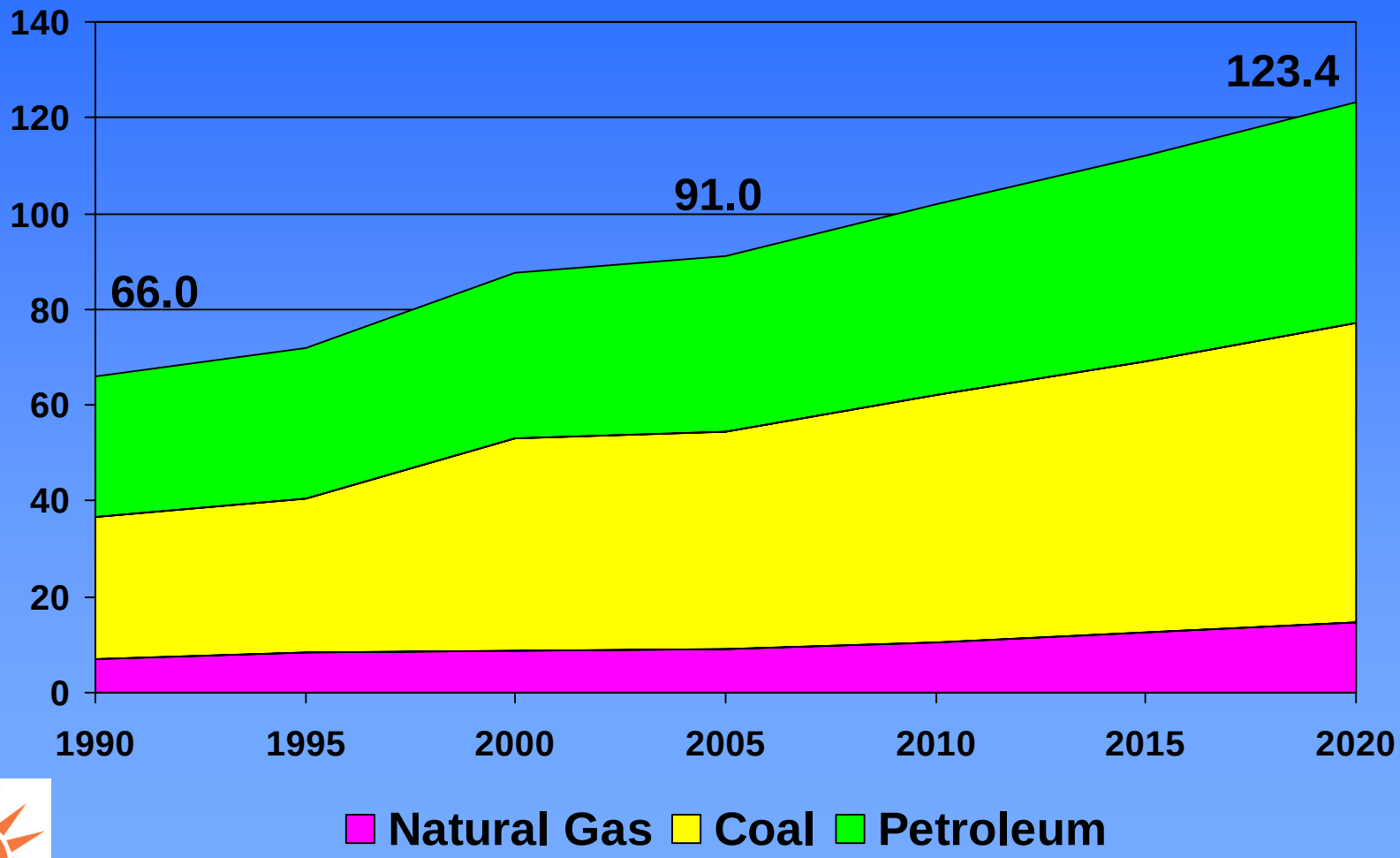
What are BioFuels?

- ✓ Transportation fuels
- ✓ Made from a renewable feedstock
- ✓ Can be used in all Diesel and Flex-Fuel vehicles
- ✓ Ethanol (E85)
- ✓ Biodiesel (B20)

Why are BioFuels Important?

- ✓ Reduce emissions
- ✓ Decrease dependence on foreign oil
- ✓ Reduce energy costs
- ✓ Help SC economy and farmers

South Carolina Emissions



Carbon Dioxide Emissions – Million Metric Tons

BioFuels Reduce Air Emissions

- Ethanol
  - reduces ***net*** production of carbon dioxide
  - 25% less carbon monoxide
  - 25% less nitrogen oxide
  - 32% less greenhouse gas emissions.
- Biodiesel
  - reduces ***net*** carbon dioxide production
  - virtually no sulfur.

BioFuels Decrease Oil Reliance

- By reducing transportation fuel demand for oil significantly decrease oil imports.
- Additionally, E85 and B20-B100 significantly stretch the 'life' of a gallon of oil.
- Example: Ethanol = 85%, Gasoline = 15%

  A 25mpg Flex-Fuel car can go 100+ miles on one gallon of gasoline.

SC E85 Consumption (gallons)

2004	2005	2006 est.
506,187	6,562,508	7,900,000

SC B20 Consumption (gallons)

2004	2005	2006 est.
303,975	462,460	760,000

Reduce Energy Costs

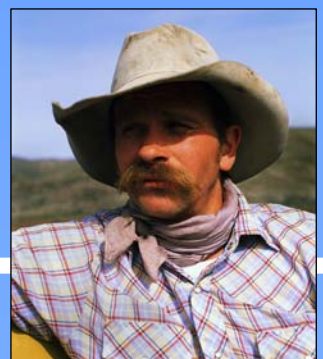
- Ethanol is less expensive then other fuel additives (eg. MTBE).
- Ethanol is usually less expensive then regular gasoline. Biodiesel consistently less expensive.
- Reduction in costs will be compounded once state production facilities online.
- Reduce flux in gasoline prices.
- Long-term will be far less expensive.

Benefit to the Local Economy

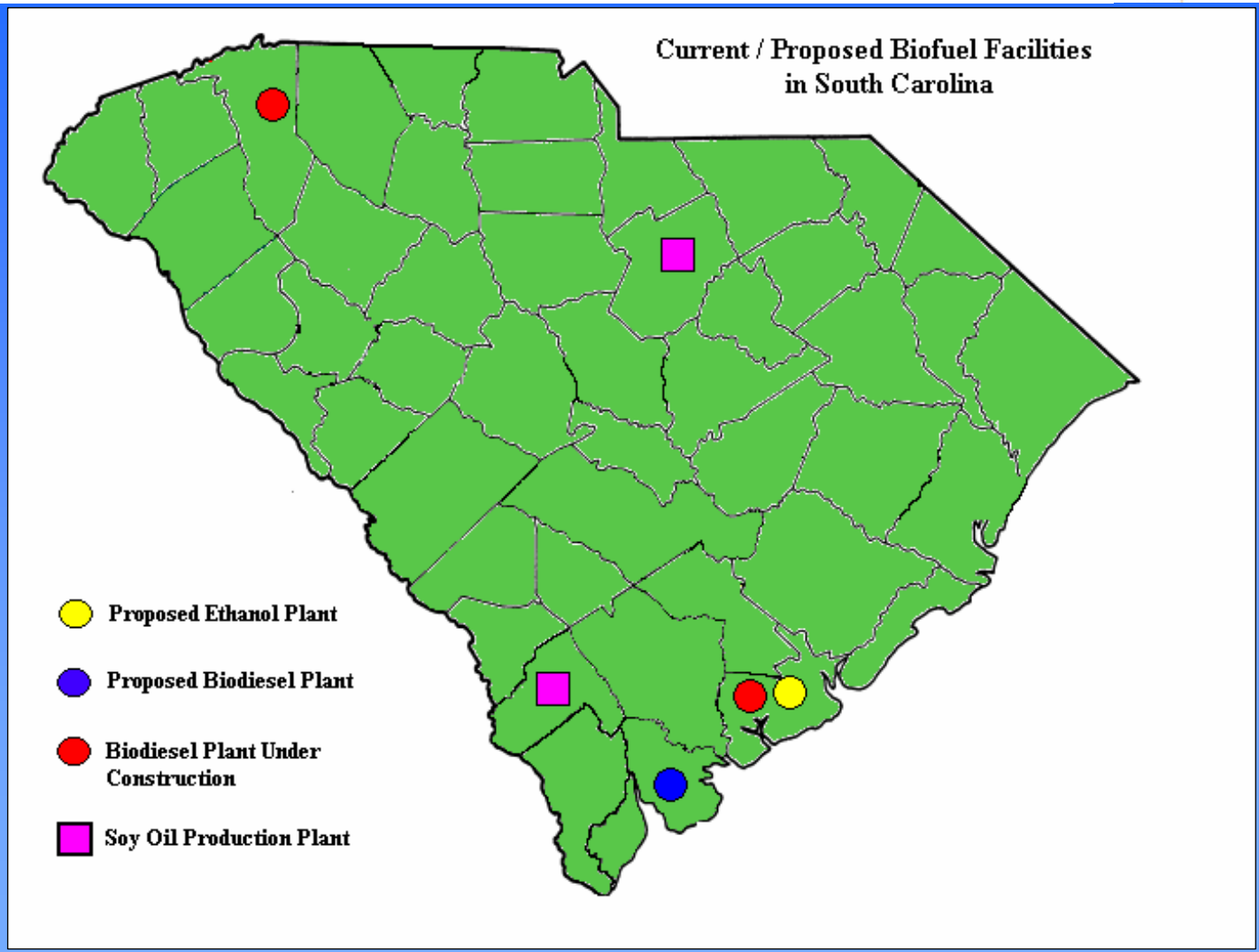
- ✓ New biofuel production facilities = new jobs

  Already have two facilities under construction equaling ~ 50 new jobs
- ✓ 'Spin-off' jobs for local economy
- ✓ Direct benefit to agricultural community

  Sale of feedstock to production facility = more $ for crop & new opportunities for marginal land



Production in South Carolina



Do I have a Flex-Fuel?

A complete list available on www.E85fuel.com

Auto Manufacturers include:

Daimler Chrysler

General Motors

Ford

Isuzu

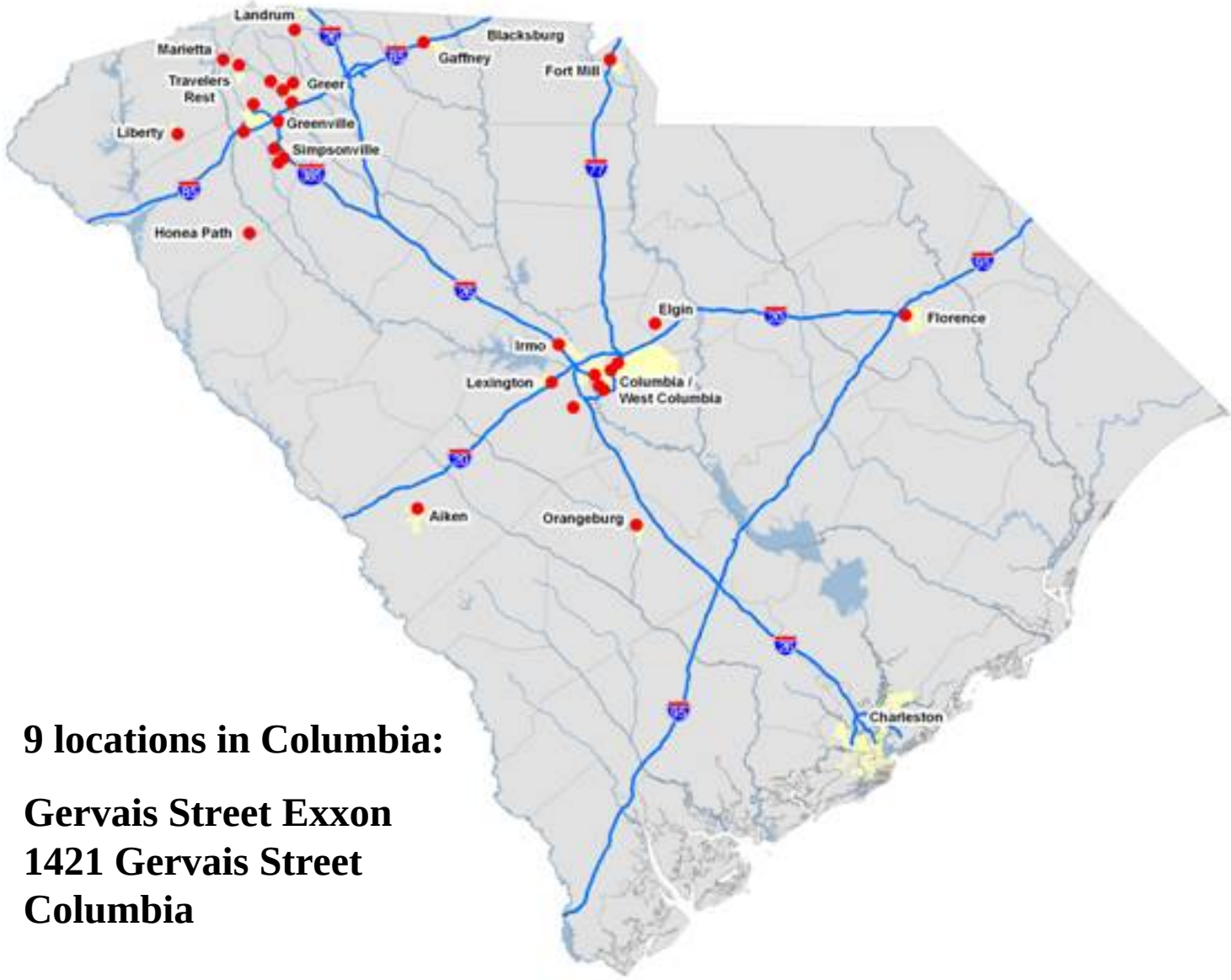
Mazda

Mercedes

Mercury

Nissan

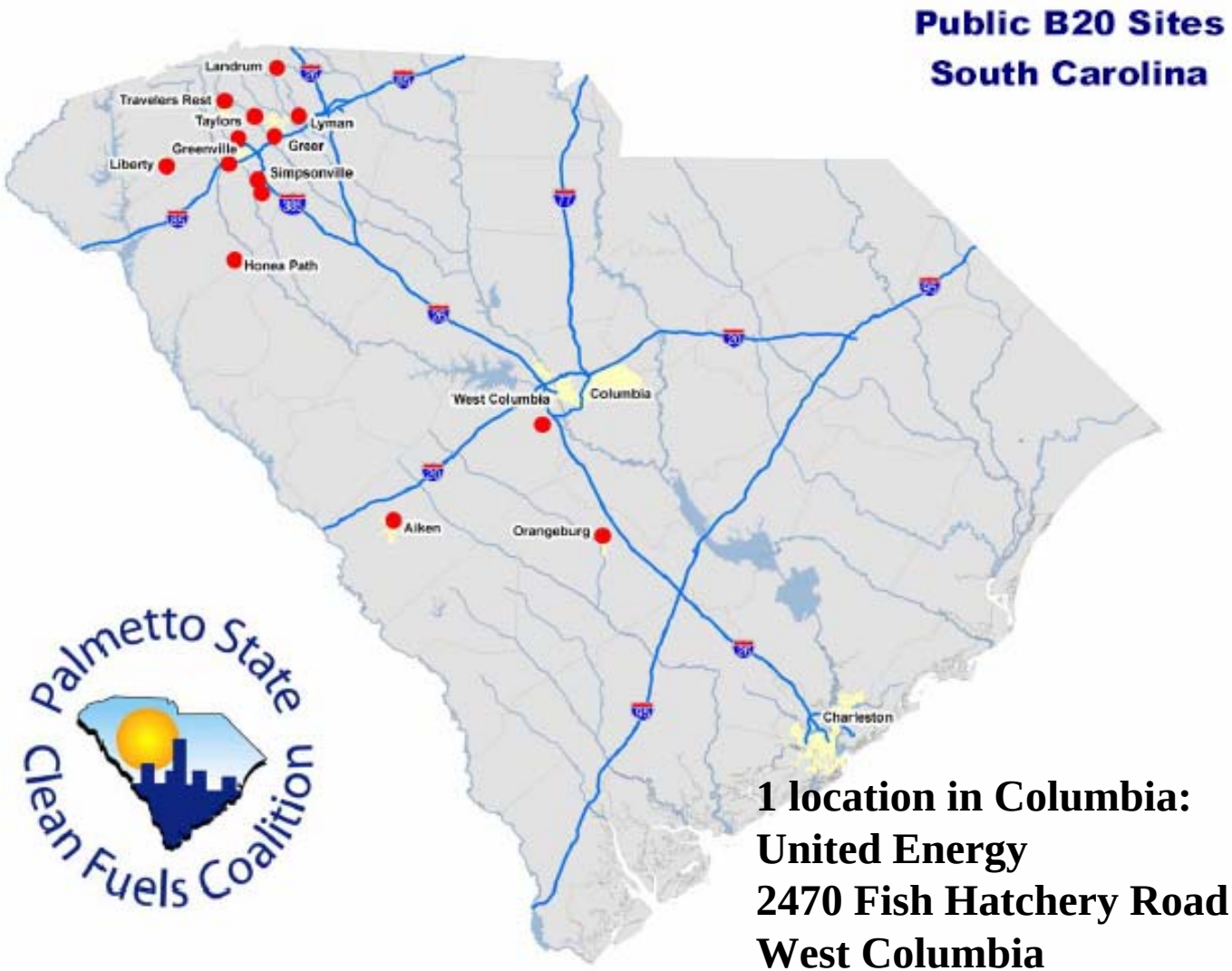
E85 Locations



9 locations in Columbia:

Gervais Street Exxon
1421 Gervais Street
Columbia

B20 Locations



1 location in Columbia:
United Energy
2470 Fish Hatchery Road
West Columbia

BioFuel Feedstocks

- Ethanol
  - Primarily made from corn alcohol
  - Can also be produced from sugar products (ex: sugar cane, sugar beets, etc.)
  - Can be made from fruits (ex: peaches, apples, plums, etc.)

BioFuel Feedstocks

- Biodiesel
  - Primarily produced from soy oil
  - Can also be produced from waste grease (yellow grease, brown grease, pure vegetable oil, etc.)
  - Can also be produced from other oil plants (canola oil, flax oil, sunflower oil, etc.)

Emerging Technologies

- Cellulosic Ethanol
  - Could make ethanol from corn stover, wood pulp, switchgrass, or any other biomass matter.
  - The process requires one additional step using an enzyme that would break apart cell wall.
  - Enzymes have been dis
    a commercial-scale faci
  - Will be the most sustain
    in the future – least emi

Emerging Technologies

- Biodiesel from waste streams
  - Research into using human and animal waste to create biodiesel feedstock.
  - 'Green' diesel could be produced from ANY biomass including yard debris and used in stationary engines.
  - Biogasification produces biofuel as a bi-product of the process.

Other Alternative Fuels

- Compressed Natural Gas (CNG)
- Hybrid
- Plug-in Hybrid
- Hydrogen

Who is Promoting Alternative Fuels?

- State & Federal fleet management
- State & Federal legislators
- Researchers
- Advocacy groups
- Businesses/Banks

Legislative Incentives

South Carolina FY 2007 Tax Incentives:

- Alternative Energy Proviso in Budget Bill
  - $300 sales tax rebate on FlexFuel Vehicles
  - $300 sales tax rebate on Plug-In Hybrid
  - $500 sales tax rebate to purchase equipment to convert a hybrid vehicle to plug-in hybrid
  - $300 sales tax rebate on hydrogen fuel cell vehicles
  - $.05 tax credit for each gallon of E85 sold
  - $.05 tax credit for each gallon of B20 sold

Legislative Incentives

- S. 1245
  - $.20 tax credit per gallon ethanol produced
  - $.20 tax credit per gallon biodiesel produced
  - 25% of equipment costs to produce ethanol and biodiesel
  - 25% of equipment costs to dispense ethanol and biodiesel
- H.4312: state income tax credit on hybrid, fuel cell, alternative fuel, or lean burn vehicles of 20% of the credit received for federal income taxes.

Publications

- *South Carolina Biomass Brief*
- *Biomass Energy Potential in South Carolina: A Conspectus of Relevant Information*
- *Availability of Yellow Grease in South Carolina*
- *A Survey of State Legislative Incentives for Alternative Transportation Fuel*
- Go to www.scbiomass.org

Other Resources

Palmetto State Clean Fuels Coalition

- www.palmettocleanfuels.org

Governors Ethanol Coalition

- www.ethanol-gec.org

Renewable Fuels Coalition

- www.ethanolrfa.org

National Biodiesel Board

- www.biodiesel.org

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